Using FlowCAM Technology to Characterize Delta Plankton

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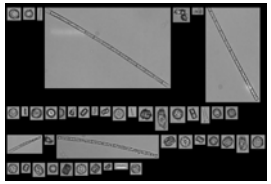
Summary

The FlowCAM is a digital imaging flow cytometer than can be used to characterize phytoplankton and zooplankton communities. The flow cytometer is currently being evaluated for use in the San Francisco Delta as part of a CALFED grant. So far, it has been successfully used to characterize the magnitude of toxic cyanobacterium blooms of *Microcystis* and to identify and quantify phytoplankton and zooplankton communities in preserved samples. Currently, it is being used to characterize live phytoplankton communities at 10 minute intervals during in situ water quality transect studies. The flow cytometer is relatively easy to use, has performed well in all tests and has not been adversely affected by the high turbidity in the delta.

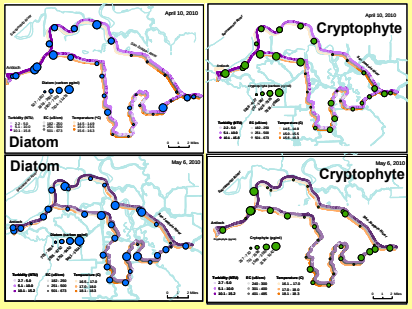
In the field, the FlowCAM collects digital images of live phytoplankton as water passes through the machine every 10 minutes and identifies the species based on an image library.



Real time field identification of live phytoplankton

The FlowCAM is successfully being used on boat transect studies in real time monitoring mode to simultaneously quantify the high frequency variation of the phytoplankton community and associated physical and chemical variables such as turbidity, water temperature and salt concentration.

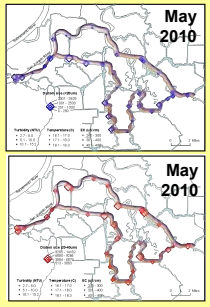
Carbon



April 2010

May 2010

Size structure

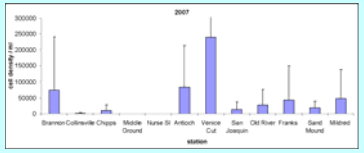


Diatom <20µm wide

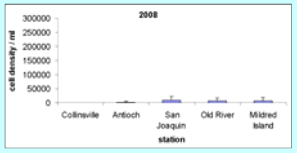
Diatom 20-40µm wide

Laboratory identification of preserved phytoplankton

The FlowCAM is successfully being used to quantify the cell density of the toxic cyanobacterium Microcystis and zooplankton in the delta from preserved samples collected in 2007 and 2008.

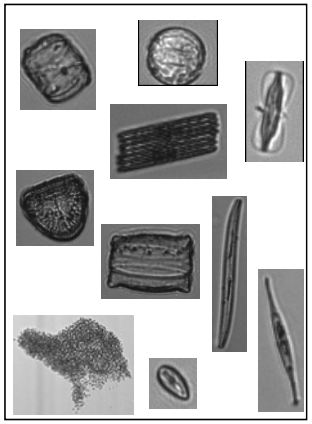


Microcystis cell density 2007

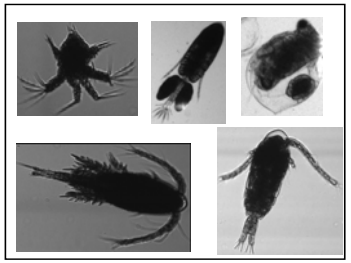


Microcystis cell density 2008

Delta phytoplankton images



Delta zooplankton images



Findings

- **The FlowCAM can be used effectively to quantify live and preserved phytoplankton ≥15µm and preserved zooplankton.**
- **The heavy sediment and detritus in the Delta does not impair the use of the FlowCAM for live or preserved samples.**
- **Plankton in both live and preserved samples can be quantified using the FlowCAM, but the most efficient sampling is done with live samples due to the chlorophyll fluorescence trigger in the FlowCAM that separates living and detrital material.**

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